Replacement Gas Furnace Check List

Customer _____ **Contractor** _____

Telephone _____ **Brand/Model #** _____

Date Installed _____ **Serial #** _____

WisWap BID# _____ ***or*** **WHEAP Agency** _____

Inspection/Adjustments

PMI=per manufacturer's instructions

(✔ box, enter test results or enter requested number as item is inspected or completed. Indicate "N/A" if not applicable.)

❒ Propane ❒ Natural gas

❒ Photos documenting furnace conditions and manufacturer nameplate were taken and provided to Agency

❒ Installation information sticker (*installer name, phone number, date*)

❒ Warranty and manual in envelope attached to the furnace cabinet

Size calculated for the new furnace Btus Input _____ Measured Input (Clock meter) _____

❒ Agency given a copy of sizing calculation.

Gas Pressure [Inches of water column (IWC)]: Input _____ Manifold _____

Electrical ❒ Working Safety Switch on/in reach of furnace

❒ Dedicated Circuit and fuse or circuit breaker properly rated

❒ Set heat anticipator (thermostat) PMI ❒ Not applicable

❒ Furnace elevated off basement floor. Note: Furnace not in basement, can be on floor.

Gas Piping ❒ Sized for BTUs All Appliances ❒ No Leaks ❒ Shut Off Present

❒ CSST Bonded ❒ Sediment Trap Present

❒ Condensate properly drained per local code and PMI

❒ Combustion air pipe properly installed, terminated, and supported (PMI) ❒ Sealed test hole

❒ Exhaust piping properly installed, terminated and supported (PMI) ❒ Sealed test hole

Air Filter: ❒ Opening Covered/Sealed

❒ Filter easily removed with no obstructions

Filter(s) installed and replacements provided _____(total #) Size _____

❒ Distribution plenums sealed; all major duct leaks properly sealed per specs

❒ Orphaned water heater has proper draft

Performance Testing

(Enter test result. Indicate "N/A" if installation is space heater.)

Steady State Efficiency Test

Adjust to achieve combustion standards

SSE %	O_2 %	CO ppm	Combustion Air F°	Flue F°	PMI AFUE %

Distribution Static Pressure

Measured in supply and return plenums: PMI

Return Pressure	Supply Pressure	Total Pressure	PMI Max.TESP

❒ IWC
❒ Pa

Temperature Rise

Supply °F	Return °F	Total Rise (Supply - Return)	PMI Min	PMI Max

Air Flow Rate Testing Procedure

❒ Plate Method
❒ Fan Tables
❒ Other _____

Air Flow CFM

I certify that the visual inspection and the performance tests were completed as indicated.

Installer's Signature _____ Date _____

Name (Print legibly) _____

I certify that the heating system was installed to my satisfaction on the date indicated.

Customer's Signature _____ Date _____

Name (Print legibly) _____

Natural Gas and Propane Gas Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide.
Note: Always follow manufacturer's instructions, if they differ from listed specifications.

Temperature Rise [Average supply F° (front left+front right+back left+back right/4) minus return F°]					
		Supply F°			Total
+	+	+	+	=	
Total Supply	Average Supply	Return F°:-	Supply-Return F° Rise:		PMI Range
	/4=	-			

Acceptable Draft Test Readings for Gas Appliances with Respect to Outdoor Temperature					
°F	<20	21-40	41-60	61-80	>80
pa.	-5	-4	-3	-2	-1
IWC.	-.02	-.016	-.012	-.008	-.004

Table 3-2: Combustion Standards for Gas-Burning Equipment			
Gas Combustion Performance Indicator	**<75 AFUE**	**80+ AFUE**	**90+ AFUE**
Oxygen (%$O_{2)}$	5-10%	4-9%	4-9%
Stack temperature (°F)	350°-475°	325°-450°	90°-120°
Carbon monoxide (CO) parts per million (ppm)	≤ 100 ppm	≤ 100 ppm	≤ 100 ppm
Steady-state efficiency (SSE) (%)	68-74%	80-82%	92-97%
Gas Pressure (IWC)	3.2-4.0 IWC*	3.2-4.0 IWC*	3.2-4.0 IWC*
Propane pressure (IWC)	10-11 IWC*	10-11 IWC*	10-11 IWC*
Supply temperature (°F)	120°-140°	120°-140°	95°-140°
*per manufacturer's instructions (PMI)			

Replacement Oil Furnace Check List

Customer _____ **Contractor** _____

Telephone _____ **Brand/Model #** _____

Date Installed _____ **Serial #** _____

WisWap BID# _____ ***or*** **WHEAP Agency** _____

Inspection/Adjustments

PMI = per manufacturer's instructions

(✔ box, enter test result or enter requested number as item is inspected or completed. Indicate "N/A" if not applicable.)

- ❒ Photos documenting furnace conditions and manufacturer nameplate taken and provided to Agency
- ❒ Installation information sticker (*installer name, phone number, date*)
- ❒ Warranty and manual in envelope attached to the furnace cabinet

Size calculated for the new furnace: Btus Input_____ Nozzle GPH*_____ Nozzle Angle*_____° Nozzle Spray Type _____

*NOTE: This oil nozzle information should also be posted on furnace with date of installation (GPH/Angle/Spray Type).

- ❒ Agency given a copy of the sizing calculation.

Oil Pressure (PMI) _____ PSI Measured _____ PSI

Electrical ❒ Working Safety Switch: in reach of furnace
❒ Dedicated Circuit and fuse or circuit breaker properly rated

- ❒ Set heat anticipator (thermostat) PMI ❒ Not applicable
- ❒ Furnace elevated off basement floor
- ❒ Clearances of heating unit and its vent connector to nearby combustibles per NFPA 31

Flue draft _____ (Before barometric damper 10-15 Pa or 0.04-0.06 IWC or PMI)

Over fire draft _____ (Must be a minimum of 5 Pa. or 0.02 IWC or PMI)

- ❒ Barometric Damper Control Operates Properly
- ❒ Chimney inspected for compliance with NFPA 211

Fuel Supply ❒ New fuel filter ❒ Tank/lines comply with NFPA 31
❒ No leaks ❒ Purged fuel lines

Air Filter ❒ Opening covered/sealed
❒ Filter easily removed with no obstructions
Filter(s) installed and replacements provided _____(total #) Size _____

- ❒ Distribution plenums sealed; all major duct leaks properly sealed per specs

Performance Testing

(Enter test results. Indicate "N/A" if installation is a space heater.)

Steady State Efficiency Test

Adjust to achieve performance standards (Table 3-2).

Smoke #	SSE %	O_2 %	CO ppm	Combustion Air F°	Flue F°	PMI: AFUE%

Distribution Static Pressure

Measured in supply and return plenums: PMI.

Return Pressure	Supply Pressure	Total Pressure	PMI Max. TESP	
				❒ IWC ❒ Pa

Air Flow Rate Testing Procedure

- ❒ Plate Method
- ❒ Fan Tables
- ❒ Other

Air Flow CFM

Temperature Rise

PMI Instructions

Supply °F	Return °F	Total Rise (Supply-Return)	PMI Min	PMI Max

I certify that the visual inspection and the performance tests were completed as indicated.

Installer's Signature Date

Name (Print legibly)

I certify that the heating system was installed to my satisfaction on the date indicated.

Customer's Signature Date

Name (Print legibly)

Fuel Oil Heating System Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide.

Note: Always follow manufacturer's instructions, if they differ from listed specifications.

Table 3-6c: Minimum Combustion Standards-Oil Burning Appliances

Oil Combustion Performance Indicators	Non-Flame Retention	Flame Retention
Oxygen (%$O_{2)}$	6-9%	5-9%
Stack temperature (˚F)	325°-550°	300°-550°
Carbon monoxide (CO) parts per million (ppm)	≤ 100 ppm	≤ 100 ppm
Steady-state efficiency (SSE) (%)	≥ 75%	≥ 80%
Smoke number (1-9)	≤ 2	≤ 1
Excess air (%)	≤ 80%	≤ 35%
Oil pressure pounds per square inch (psi)	≥ 100 psi	≥ 100-150 psi*
Over fire draft (Pascals or IWC negative)	5 Pa. or .02 IWC	5 Pa or .02 IWC
Flue draft (Pascals or IWC negative)	10-15 Pa. or 0.04-0.1 IWC *	10-15 Pa. or 0.04-0.1 IWC *
*per manufacturer's instructions (PMI)		

Temperature Rise

[Average supply F° (front left+front right+back left+back right/4) minus return F°)

Supply F°				Total
+	+	+	+	=

Total Supply	Average Supply	Return F°:-	Supply-Return F° Rise:		PMI Range
	/4=	-			

Hot Water Boiler Replacement Check List

Customer _____ **Contractor** _____

Telephone _____ **Brand/Model #** _____

Date Installed _____ **Serial #** _____

WisWap BID# _____ ***or*** **WHEAP Agency** _____

Boiler Fuel Type ❒ Oil ❒ Natural Gas ❒ Propane (LP)

Inspection/Adjustments

PMI = per manufacturer's instructions

(✔ box, enter test result or enter requested number as item is inspected or completed. Indicate "N/A" if not applicable.)

❒ Photos documenting boiler conditions and manufacturer nameplate were taken and provided to Agency

❒ Installation information sticker (*installer name, phone number, date*)

❒ Warranty and manual in envelope attached to the boiler cabinet

NG/LP - New boiler size calculation: Btus Input _____ Measured Input (clock meter) _____

OIL - New boiler size calculation: Nozzle GPH _____ Nozzle Angle _____^{o} Nozzle Type _____

Electrical ❒ Working Safety Switch in reach of boiler ❒ Dedicated Circuit and fuse or circuit breaker properly rated

❒ Boiler elevated off basement floor

Gas Piping ❒ Sized for BTUs All Appliances ❒ No Leaks ❒ CSST Bonded

❒ Sediment Trap Present ❒ Shut Off Present

Fuel oil ❒ New fuel filter ❒ Purged fuel lines

❒ No leaks ❒ Tank/lines comply with NFPA 31

❒ Pressure PMI Gas Manifold _____IWC Gas Input _____IWC Oil _____PSI

❒ Installed pressure relief valve: PMI

❒ Vent and air intake properly installed or barometric damper control operates properly : PMI

❒ Inspect and bleed air from radiators and the entire system

❒ Check clearances of heating unit and its vent connector to nearby combustibles
[Gas: International Fuel Gas Code (IFGC); Oil: per NFPA 31]

Installed: Indicate devices installed. Steps must be taken to prevent condensation in non-condensing units.

❒ Air excluding device ❒ Automatic fill valve ❒ Mixing Valves

❒ Backflow preventer ❒ Piping bypasses ❒ Other: _____

❒ Condensate properly drained per local code and PMI

❒ Expansion tank properly sized for system Tank Air Pressure: _____

Performance Testing

(Enter test result. Indicate "N/A" if installation is a space heater.)

Heat Anticipator: PMI_____ Setting _____

Steady State Efficiency Test

❒ CO_2 / ❒ O_2	CO	SSE	Smoke	Intake F^{o}	Exhaust F^{o}	PMI AFUE
Low Fire						
High Fire						
Low Fire PMI						
High Fire PMI						

Water Temperature

Supply F° _____

Return F° _____

Draft Measurement ❒ IWC ❒ Pa

Oil: Measure draft between barometric damper and collar; at over fire. Flue _____ Over fire ____

Gas: Halfway between collar and chimney. Flue _____ ❒ NA ❒ IWC ❒ Pa

I certify that the visual inspection and the performance tests were completed as indicated.

Installer's Signature Date

Name (Print legibly)

I certify that the heating system was installed to my satisfaction on the date indicated.

Customer's Signature Date

Name (Print legibly)

Boiler Natural Gas, LP & Fuel Oil Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide.
Note: Always follow manufacturer's instructions, if they differ from listed specifications.

Acceptable Draft Test Readings for Gas Appliances with Respect to Outdoor Temperature					
°F	<20	21-40	41-60	61-80	>80
pa.	-5	-4	-3	-2	-1
IWC.	-.02	-.016	-.012	-.008	-.004

Table 3-2: Combustion Standards for Gas-Burning Equipment			
Gas Combustion Performance Indicator	**<75 AFUE**	**80+ AFUE**	**90+ AFUE**
Oxygen (%$O_{2)}$	5-10%	4-9%	4-9%
Stack temperature (°F)	350°-475°	325°-450°	90°-120°
Carbon monoxide (CO) parts per million (ppm)	≤ 100 ppm	≤ 100 ppm	≤ 100 ppm
Steady-state efficiency (SSE) (%)	68-74%	80-82%	92-97%
Gas Pressure (IWC)	3.2-4.0 IWC*	3.2-4.0 IWC*	3.2-4.0 IWC*
Propane pressure (IWC)	10-11 IWC*	10-11 IWC*	10-11 IWC*
Supply temperature (°F)	120°-140°	120°-140°	95°-140°
*per manufacturer's instructions (PMI)			

Table 3-6c: Minimum Combustion Standards-Oil Burning Appliances			
Oil Combustion Performance Indicators		**Retention**	**Flame Retention**
Oxygen (%O_2)		6-9%	5-9%
Stack temperature (°F)		325°-550°	300°-550°
Carbon monoxide (CO) parts per million (ppm)		≤100 ppm	≤100 ppm
Steady-state efficiency (SSE) (%)		≥75%	≥80%
Smoke number (1-9)		≤2	≤1
Excess air (%)		≤80%	≤35%
Oil pressure pounds per square inch (psi)		≥100 psi	≥100-150 psi*
Over fire draft (Pascals or IWC negative)		5 Pa. or .02 IWC	5 Pa or .02 IWC
Flue draft (Pascals or IWC negative)		10-15 Pa. or 0.04-0.1 IWC *	10-15 Pa. or 0.04-0.1 IWC *
Return Water Temperature-Non-condensing (°F)		>150 (°F)	>150 (°F)
*per manufacturer's instructions (PMI)			

Heating System Repair or Clean and Tune Check List

Customer: _____ **Contractor:** _____

Telephone: _____ **Work Date(s):** _____

WHEAP/WX Agency: _____ **WisWap BID #:** _____

Fuel Type: ❑ Natural Gas ❑ LP/Propane ❑ Oil ❑ Other: _____ System Type: ❑ Forced Air ❑ Boiler ❑ Space Heater ❑ Other: _____

Clean, inspect, test, and repair: Perform the following inspection procedures and maintenance practices on heating systems as necessary. The goal of these measures is to reduce carbon monoxide (CO), adjust fuel-air mixture, improve steady-state efficiency and verify the operation of safety controls. All holes that are drilled should be properly sealed after completion of testing.

All Systems	(✔ box as item is inspected or completed. Indicate "NA" if non-applicable. PMI=per manufacturer's instructions)
Emergency shut off	❑ Switch is on the unit or reachable and is operational
Electrical service.	❑ Inspect circuit. Rated for application. Note problems, make recommendations.
Fuel lines/storage tanks.	❑ No leaks present. Shut off present. Filter or sediment trap is present and clean.
Blower	❑ Clean.
Air Handler	❑ Clean.
Air Filter	❑ Clean or replace.
Heat exchanger	❑ Clean surface & inspect for leaks; inform customer & agency if exchanger is cracked.
Filter slot/filters	❑ Filter slot with cover is present. Replacement filters/ permanent filter present.
Thermostat	❑ Set heat anticipator to amperage measured in control circuit or PMI.
Oil Heating Unit	
Oil filter	❑ Replace.
Nozzle	❑ Replace after calculating heat-load.
Electrodes	❑ Adjust gap and position in burner tube PMI.
Transformer	❑ Clean contacts. Measure voltage; replace if voltage is not within PMI.
Burner assembly and burner tube assembly	❑ Clean. Inspect for over burning. Replace flame retention head if damaged.
Combustion chamber	❑ Clean. If necessary, repair combustion chamber or replace.
CAD/Stack Control Cell	❑ Test. Verify that the burner shut off, PMI, when the cad cell is blocked from flame.
Flame Ignition	❑ Test. Ignition must be instantaneous; Pre-purge type unit, blower on prior to ignition.
Barometric Damper	❑ Plumb, level, swings freely.
Flue draft (before barometric damper)	❑ Measure and adjust as needed. (10-15pa or 0.04-0.06 IWC or PMI).
Over fire draft	❑ Measure and adjust as needed (5 Pa. or 0.02 IWC or PMI).
High limit control	❑ Measure shut off temperature adjust or replace if >250F^0 (furnace), 180 F^0(boiler).
Oil Pump Pressure	❑ Measure, adjust to PMI.
NG or LP Heating Unit	
Burners	❑ Check for dust, debris, misalignment, flame impingement, and other flame-interference problems. Clean, vacuum, and adjust as needed.
Burner/Manifold	❑ No soot, melted wire insulation, & rust in the burner & manifold area outside of firebox.
Pilot (if equipped)	❑ Burning, good ignition, check safety control for gas valve shut-off when pilot is out.
Gas Pressure (IWC)	❑ Input _____ Manifold

Test Results

Steady State Efficiency Test

Adjust to achieve combustion standards (Table 3-2 or 3-3).

SSE	O^2	CO	Smoke	Flue F^o

Distribution Static Pressure

Measured in supply and return plenums: PMI.

Return Pressure	Supply Pressure	Air Flow Rate	Total Pressure	Maximum TESP

Temperature Rise

PMI. If no instructions see specifications.

Supply °F	Return °F	Total Rise (Supply-Return)	PMI Range Min	PMI Range Max

I certify that the visual inspection, repair, maintenance, and the performance tests were completed as indicated.

Installer's Signature _____ Date _____

I certify that the heating system repair or maintenance work performed was to my satisfaction on the date indicated.

Customer's Signature _____ Date _____

Natural Gas, LP & Fuel Oil Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide.
Note: Always follow manufacturer's instructions, if they differ from listed specifications.

Temperature Rise [Average supply F° (front left+front right+back left+back right/4) minus return F°]					
Supply F°					Total
+	+	+	+		=
Total Supply	Average Supply	Return F°:-	Supply-Return F° Rise:		PMI Range
	/4=	-			

Acceptable Draft Test Readings for Gas Appliances with Respect to Outdoor Temperature					
°F	<20	21-40	41-60	61-80	>80
pa.	-5	-4	-3	-2	-1
IWC.	-.02	-.016	-.012	-.008	-.004

Table 3-2: Combustion Standards for Gas-Burning Equipment			
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Stack temperature (°F)	350°-475°	325°-450°	90°-120°
Carbon monoxide (CO) parts per million (ppm)	≤ 100 ppm	≤ 100 ppm	≤ 100 ppm
Steady-state efficiency (SSE) (%)	68-74%	80-82%	92-97%
Gas Pressure (IWC)	3.2-4.0 IWC*	3.2-4.0 IWC*	3.2-4.0 IWC*
Propane pressure (IWC)	10-11 IWC*	10-11 IWC*	10-11 IWC*
Supply temperature (°F)	120°-140°	120°-140°	95°-140°
*per manufacturer's instructions (PMI)			

Table 3-6c: Minimum Combustion Standards-Oil Burning Appliances

Oil Combustion Performance Indicators	**Non-Flame**	**Flame Retention**
Oxygen ($\%O_2$)	6-9%	5-9%
Stack temperature (°F)	325°-550°	300°-550°
Carbon monoxide (CO) parts per million (ppm)	≤ 100 ppm	≤ 100 ppm
Steady-state efficiency (SSE) (%)	≥ 75%	≥ 80%
Smoke number (1-9)	≤ 2	≤ 1
Excess air (%)	≤ 80%	≤ 35%
Oil pressure pounds per square inch (psi)	≥ 100 psi	≥ 100-150 psi*
Over fire draft (Pascals or IWC negative)	5 Pa. or .02 IWC	5 Pa or .02 IWC
Flue draft (Pascals or IWC negative)	10-15 Pa. or 0.04-0.1 IWC *	10-15 Pa. or 0.04-0.1 IWC *
*pmi=per manufacturer's instructions		